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APPROVALS		DATE	<b>INSTRUCTIONS FOR CONTINUED AIRWORTHINESS</b>			
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Rev J	<ol style="list-style-type: none"> <li>1. Correct typographical error in Sec. 5.1.1.</li> <li>2. Update AHRS Installation Manual version number in Sec. 5.4.5</li> <li>3. Add configuration, K-factor setting references to Sec. 6.1.5.</li> </ol>	7/28/04	D. Boston
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Rev. B	Initial Wulfsberg Release Per DCN W1894		

## LIST OF EFFECTIVE PAGES

<b>Section</b>	<b>Page</b>	<b>Date</b>
<b>0</b>	1	01-31-03
	2	01-31-03
	3	01-31-03
	4	01-31-03
	4&5	11-8-03
<b>1.0</b>	5	05-28-03
	6	09-26-02
<b>1.3</b>	6	11-8-03
<b>1.4</b>	7	5-01-04
<b>2.0</b>	7	11-20-02
	8	11-20-02
	8-11	5-01-04
	9	11-20-02
<b>2.5</b>	14-15	5-01-04
<b>3.0</b>	10	11-20-02
<b>4.0</b>	10	11-20-02
<b>5.0</b>	11	11-20-02
	12	11-20-02
	13	11-20-02
<b>5.1.1</b>	16	7-27-04
<b>5.1.2</b>	16	11-8-03
<b>5.4.2</b>	17	11-8-03
<b>5.4.5</b>	18	7-27-04
<b>6.0</b>	19	5-01-04
<b>6.1</b>	19-20	5-01-04
<b>6.1.5</b>	20	7-27-04
<b>14</b>	22	12-12-03
<b>6.0</b> <b>7.0</b>	14	03/27/03
<b>8.0</b> <b>9.0</b> <b>10.0</b>	21	5-01-04
<b>11.0</b> <b>12.0</b> <b>13.0</b> <b>14.0</b> <b>15.0</b>	16	11-20-02
<b>16.0</b>	17	11-20-02

<b>1</b>	<b>INTRODUCTION</b>	<b>6</b>
1.1	<i>PURPOSE</i>	6
1.2	<i>EFFECTIVITY</i>	6
1.3	<i>CHANGES AND UPDATES TO THE ICA</i>	6
1.4	<i>REFERENCE DOCUMENTS</i>	6
1.5	<i>APPLICABLE FAR</i>	7
1.6	<i>GENERAL WIRING AND MAINTENANCE</i>	7
1.6.1	Wire Separation	7
1.6.2	Wire Routing	7
1.6.3	Securing Wire Bundles	8
1.6.4	Wire Termination	8
<b>2</b>	<b>SYSTEM DESCRIPTION</b>	<b>8</b>
2.1	<i>SYSTEM COMPONENTS AND SPECIFICATIONS</i>	9
2.2	<i>SYSTEM CONFIGURATION</i>	11
2.3	<i>CAUTION/WARNING/ADVISORY SYSTEM</i>	12
2.4	<i>DISPLAYS</i>	13
2.5	<i>REMOTE SENSORS</i>	14
2.5.1	Attitude and Heading Reference Sensor	14
2.5.2	WAAS-GPS	14
2.5.3	Air Data Computer	15
2.5.4	Analog Interface Unit	15
2.5.5	Securaplane XL2410 Dedicated Battery	15
2.5.6	Power Sonic PS-12180 Dedicated Battery	15
<b>3</b>	<b>CONTROL AND OPERATION INFORMATION</b>	<b>16</b>
<b>4</b>	<b>SERVICING INFORMATION</b>	<b>16</b>
4.1	<i>EFIS IDU</i>	16
4.2	<i>28 VDC DEDICATED BATTERY (OPTIONAL)</i>	16
4.3	<i>12 VDC DEDICATED BATTERY (OPTIONAL)</i>	16
<b>5</b>	<b>MAINTENANCE INSTRUCTIONS</b>	<b>16</b>
5.1	<i>DATABASE UPDATES</i>	16
5.1.1	Navigation and Obstruction Data Bases	16
5.1.2	Terrain Data Base	17
5.2	<i>SECURAPLANE XL2410 DEDICATED BATTERY</i>	17
5.3	<i>STRUCTURAL INSPECTIONS</i>	17
5.4	<i>SYSTEM OPERATIONAL CHECKOUT AFTER MAINTENANCE</i>	17
5.4.1	EFIS II IDU Maintenance	17
5.4.2	GPS Sensor Maintenance	17
5.4.3	Analog Interface Unit (AIU) (Optional) Maintenance	18
5.4.4	Fuel/Airdata Computer (ADC) Maintenance	18
5.4.5	AHRS Maintenance	18
5.4.6	28 VDC Dedicated Battery (Optional) Maintenance	18
5.4.7	12 VDC Dedicated Battery (Optional) Maintenance	19

<b>6</b>	<b>TROUBLESHOOTING INFORMATION</b>	<b>19</b>
6.1	<i>REMOVE AND REPLACEMENT INFORMATION</i>	19
6.1.1	Flight Logic Synthetic Vision EFIS IDU	20
6.1.2	GPS Sensor	20
6.1.3	GPS Antenna	20
6.1.4	Analog Interface Unit (AIU) (Optional)	20
6.1.5	Fuel/Airdata Computer (ADC)	20
6.1.6	AHRS500GA	20
6.1.7	LCR-93 AHRS (Alternate Part)	20
6.1.8	28 VDC Dedicated Battery (Optional)	20
6.1.9	12 VDC Dedicated Battery (Optional)	21
<b>7</b>	<b>WIRING DIAGRAMS</b>	<b>21</b>
<b>8</b>	<b>SPECIAL INSPECTION REQUIREMENTS</b>	<b>21</b>
8.1	<i>IDU-III Internal Cooling Fan Service Procedure</i>	21
<b>9</b>	<b>APPLICATION OF PROTECTIVE TREATMENTS</b>	<b>22</b>
<b>10</b>	<b>DATA FOR STRUCTURAL FASTENERS</b>	<b>22</b>
<b>11</b>	<b>LIST OF SPECIAL TOOLS</b>	<b>22</b>
<b>12</b>	<b>COMMUTER CATEGORY AIRCRAFT</b>	<b>22</b>
<b>13</b>	<b>RECOMMENDED OVERHAUL PERIODS</b>	<b>22</b>
<b>14</b>	<b>AIRWORTHINESS LIMITATIONS</b>	<b>22</b>

# 1 INTRODUCTION

## 1.1 PURPOSE

The purpose of this Instructions For Continued Airworthiness Document is to provide the line maintenance Technician with the information necessary to ensure the continued airworthiness of the Chelton Flight Systems, Flight Logic Synthetic Vision EFIS, flight and navigation instrumentation system as installed under STC SA02203AK.

This plan is designed to comply with FAA regulatory requirements for Instructions For Continued Airworthiness.

### NOTE

**This plan must be placed into the aircraft operator's Aircraft Maintenance Manual and Incorporated into the operator's scheduled maintenance program.**

## 1.2 EFFECTIVITY

This continued Airworthiness plan is effective for all aircraft, incorporated with the Chelton Flight Systems, Flight Logic Synthetic Vision EFIS, flight and navigation instrumentation system as noted in above STC.

## 1.3 CHANGES AND UPDATES TO THE ICA

Changes to the ICA are envisioned only in the event of a change to the hardware or software within the EFIS. In the case of H/W or S/W changes or upgrade, the latest version of the ICA will be made available to the aircraft owner/operator upon completion of the changes. This latest version of this document and any associated *Service Bulletins* can be found on the Chelton web site at [www.cheltonflightsystems.com](http://www.cheltonflightsystems.com), under the *Dealer*, pull down menu. For minor, typographical or grammatical changes, where no functional or operational descriptions are affected, no notice of change will be made. If the document changes involve the form, fit, or function of the system, and are considered non-essential, a *Provisional Service Bulletin* will be issued, informing the operators of this change, and how to go about obtaining an updated document. If the change is of a more severe nature and is considered critical to flight safety or system operation, the FAA will be notified in accordance with 14 CFR 21.3. Upon determination by the FAA an Airworthiness Directive may be issued, describing the nature of the change, including instructions regarding document updates and any additional service requirements.

## 1.4 REFERENCE DOCUMENTS

This document forms a part of overall aircraft continued airworthiness requirements and is to be used in conjunction with following documents as applicable. For the latest revision of the following document, see Chelton Flight Systems at [www.cheltonflightsystems.com](http://www.cheltonflightsystems.com)

<b>DOCUMENT NUMBER</b>	<b>TITLE</b>
150-045261	Instructions for Continued Airworthiness
150-045262	Airplane Flight Manual Supplement
702-045250	W/D EFIS IDU Interface
702-045251	W/D Aircraft Systems Interface
150-045264	Chelton Flight Systems Installation Guide
7410-0001-[xx]	Crossbow AHRS500GA Installation Manual
142185-0000-840	LITEF AHRS LCR-93 Installation/Maintenance Instruction
84143-01	Free Flight GPS Equipment Installation Manual
IM2830-AYS8	Shadin Fuel/Airdata Computer Installation Manual
IM1201	Shadin OAT Probe Assembly Installation Manual
150-045240	Chelton EFIS II Pilot's Guide and Reference
24-32-12	Securaplane XL2410-01 Dedicated Battery CMM
PS-12180	PS-12180 Technical Handbook
570-7000	Chelton AIU-1 Installation Manual

**NOTE: It is the responsibility of the Maintenance Technician to verify with the Vendor that the Equipment Manual being used is the latest revision.**

## **1.5 APPLICABLE FAR**

FAR Part 21.50      “Instructions for continued airworthiness and manufacturer’s maintenance manuals having airworthiness limitations sections.”  
FAR Part 23.1529      “Instructions For Continued Airworthiness”

## **1.6 GENERAL WIRING AND MAINTENANCE**

Maintenance technicians should thoroughly familiarize themselves with Chelton Flight Systems, Flight Logic Synthetic Vision EFIS installation, wiring interface, and system operation, prior to attempting to maintain or troubleshoot this system.

### **1.6.1 WIRE SEPARATION**

Whenever it becomes necessary to repair or replace a wire or group of wires, maintain the same wire separation that was used to install the system. Any wire added to or removed from the aircraft should satisfy separation requirements and wiring standards. (Ref; AC43.13-1B)

### **1.6.2 WIRE ROUTING**

Whenever it becomes necessary to repair or replace a wire or group of wires, maintain the same wire routing that was used to install the system. Wires should be routed using proper bend radius, drip loops, slack and to allow for easy access for maintenance repairs and inspection. Route wires in such a manner that it does not violate any regulatory safety requirements. (Ref; AC43.13-1B)

### 1.6.3 SECURING WIRE BUNDLES

Whenever it becomes necessary to repair or replace a wire or group of wires, clamps of the proper size, type, and material should be used. Secure repaired or replaced wiring in the same manner that it was installed in the aircraft. (Ref; AC43.13-1B)

### 1.6.4 WIRE TERMINATION

Whenever it becomes necessary to terminate wires, care should be taken to ensure enough slack in wiring for proper servicing, repair, and fit. When stripping wires for termination, be sure not to nick or cut strands of wire. Check that proper crimping tools are used, and that they are set to the proper setting for a correct crimp. When crimping terminals and/or splices use correct size for the wire gauge. If soldering is necessary be sure a cold solder joint does not exist, and that shrink tube of the proper size is installed over the wire and connection point. (Ref; AC43.13-1B)

<p><b>NOTE: It is expected that the skilled technicians performing the inspections, test, and troubleshooting of the Chelton Flight Systems, Flight Logic Synthetic Vision EFIS system, will adhere to the safety practices and operational procedures given in the basic aircraft manufacturers Maintenance Manuals.</b></p>
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## 2 SYSTEM DESCRIPTION

The EFIS is a complete flight and navigation instrumentation system that provides information to the pilot via the Integrated Display Unit (IDU). The IDU can be configured as a Primary Flight Display (PFD), or a Multi-Function Display (MFD) depending on installation. The PFD is a three-dimensional, enhanced situational awareness display that provides forward-looking terrain, attitude, altitude, airspeed, vertical speed, direction, and Highway-in-the-Sky navigation. The MFD can display a moving map, traffic, terrain, weather, HSI or a combination thereof.

The EFIS provides visual and aural warnings, cautions, and advisories for system monitoring. Warnings consist of a red flag on the IDU and a voice warning that repeats until acknowledged by the pilot. Cautions consist of an amber flag on the IDU and a one-time voice report or chime. Advisories can consist of an amber or green flag depending on condition, and a single voice report or chime.

A secondary installation consists of at least one IDU permanently assigned as PFD/MFD, up to two Air Data Computers (ADC), up to two Global Positioning System (GPS) receivers, and up to two Attitude and Heading Reference Systems (AHRS) units mounted in the radio rack with reversionary switching as needed. Standard primary flight instrumentation is retained in a secondary installation.

A primary installation consists of at least one IDU permanently assigned as the PFD and up to three additional IDUs assigned as PFD/MFD, up to two Air Data Computers (ADC), up to two Global Positioning System (GPS) receivers, up to two Attitude and Heading Reference Systems (AHRS) units, with reversionary switching as needed. The PFD must be mounted within the pilot's primary field of view.



Each IDU contains all necessary hardware, software, and databases and operates independently of the other IDUs installed. The IDU consists of a high-brightness backlit Active Matrix Liquid Crystal Display (AMLCD) screen, eight menu buttons, a selection/enter encoder, a display brightness encoder, and an optional slip indicator. The buttons, control knobs, and optional slip indicator are backlit and adjustable by the brightness encoder. Backlighting may also be controlled by the cockpit master dimming control, depending on the installation.






Photo 1, PFD





Photo 2, MFD

## 2.1 SYSTEM COMPONENTS AND SPECIFICATIONS

Table 1 depicts components of the system along with physical, and electrical, specifications.

Component	Description	Part No.	Specifications		
			Dimensions	Weight	Power
	Integrated Display Unit (IDU)	401-045500-0101	6.30"w 5.50"h 3.25"d	4.6 lbs.	12-34VDC 1.4 Amps @28 VDC,  2.8 Amps @ 14 VDC
	Slip Indicator (IDU)	310-045600-01	3.00"w 0.75"h 0.40"d	0.1 lbs.	N/A
	Non-slip bezel (IDU)	146-045520-01	3.00"w 0.75"h 0.40"d	0.1 lbs.	N/A

Component	Description	Part No.	Specifications		
			Dimensions	Weight	Power
	Tray Assembly	401-045515-02 401-045515-03 401-045515-04 401-045515-05	6.25"w 5.50"h 5.22"d	1.4 lbs.	N/A
	System Config. Card (SCC)	310-045625-01 310-045626-01 310-045628-01 310-045629-01 310-045630-01	1.75"w 1.25"h	0.1 lbs.	5 VDC
	Air Data Computer (ADC)	962830A-1-S-8 962830A-2-S-8 962830A-3-S-8	3.4"w 3.5"h 6.3"d	2.8 lbs.	14-28 VDC 1.3 Amps
	Attitude and Heading Reference System (AHRS)	8350-0062-XX	4.66"w 4.863"h 5.909"d	4.6 lbs	9-30 VDC 0.14 Amps
	Attitude and Heading Reference System (AHRS)	142185-1xxx 142185-2xxx 142185-3xxx	4.17" w 4.96" h 10.95" d	8.7 lbs	28 VDC 1.7 Amps
	Global Positioning System (GPS/ WAAS)	84100-02-03XX	4.13"w 1.60"h 6.50"d	0.8 lbs.	12-28 VDC 0.25 Amps @28 VDC, 0.5 Amps @14 VDC
	GPS Antenna	Aero 81194	3.0"w 0.5"h 4.7"d	0.375 lbs.	5 VDC (from sensor)
	GPS Antenna (Optional)	Comant CI 405-100	2.7"w 0.75"h 4.3"d	0.3 lbs.	5 VDC (from sensor)

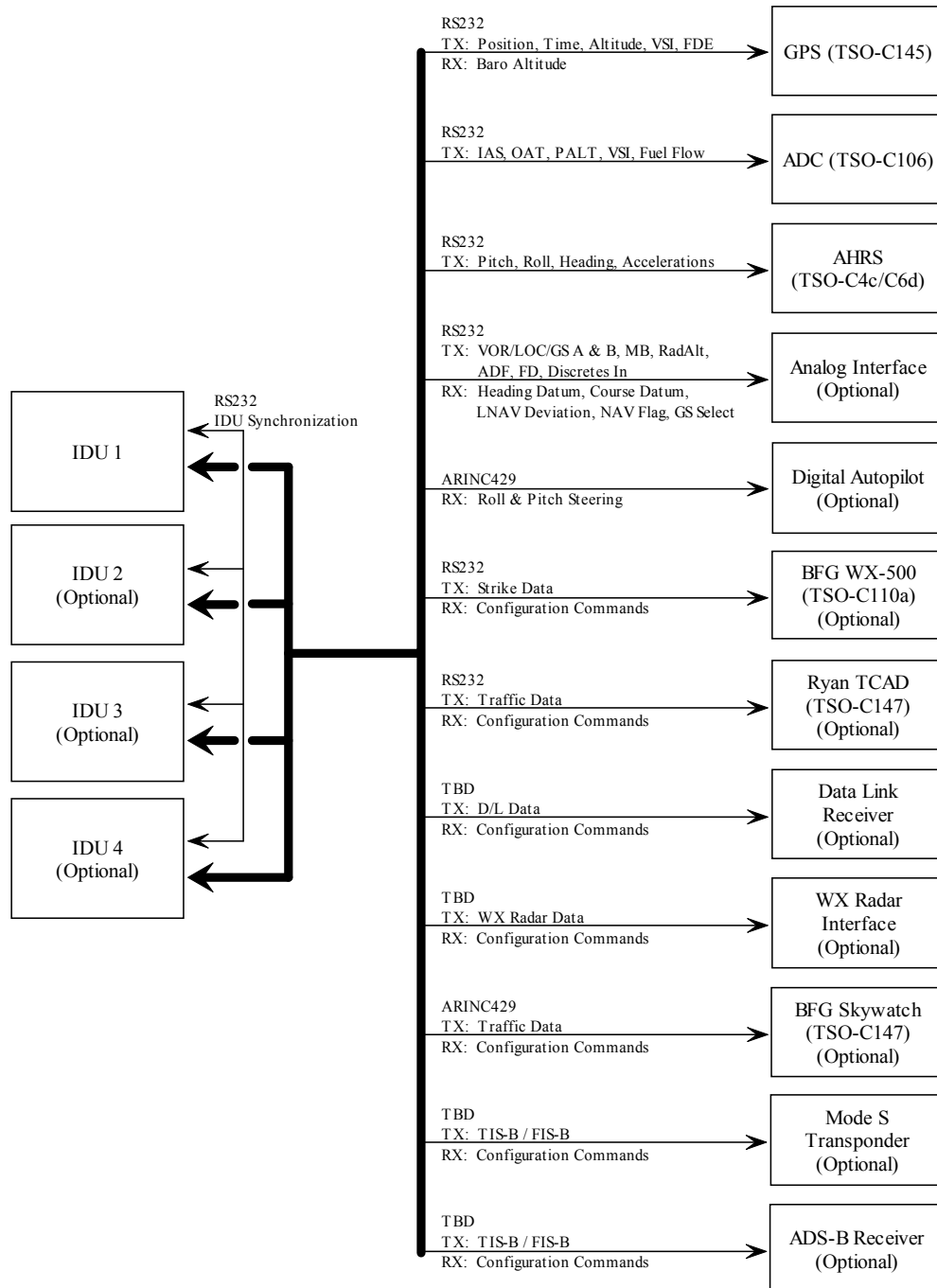
Component	Description	Part No.	Specifications		
			Dimensions	Weight	Power
	GPS/Comm Antenna (Optional)	Comant CI 2480-204	2.6"w 17.0"h 14.0"d	0.6 lbs.	5 VDC (from sensor)
	Analog Interface Unit (AIU) (Optional)	453-7000	5.05"w 3.08"h 8.12"d	2.2 lbs.	10-34VDC 0.5 Amps

**Table 1**

**NOTE: Small parts and electrical components required for installations that are not specifically called out in the parts list shall meet the requirements for aerospace use as “acceptable parts” or “standard parts”. Selection of these parts shall be in accordance with guidance provided in FAA Advisory Circular 20-62D, dated 5/24/96 (or later revision).**

## **2.2 SYSTEM CONFIGURATION**

Each display is driven by its own internal processor. A complete system consists of at least one MFD, one AHRS, one ADC, and one GPS receiver. All displays communicate with (but do not rely upon) each other and all sensors are connected to the displays in parallel, so each display is independent from all others and, except for the PFD, can show any page at any time. Data transfer between components, along with the additional equipment that can be interfaced with the EFIS are indicated in Diagram 1.



**Diagram 1, EFIS Block Diagram**

## 2.3 CAUTION/WARNING/ADVISORY SYSTEM

The Chelton FlightLogic EFIS includes an integrated auditory caution/warning/advisory (CWA) system that monitors a wide variety of parameters and provides auditory annunciations for conditions that demand pilot awareness. Auditory annunciations take the form of either a voice warning or a chime.

Annunciations are grouped into three categories: warning, caution, and advisory. Warnings are accompanied by a red flag and repeatedly annunciated until the condition is corrected or

acknowledged by the pilot (by pushing the MUTE button on the yoke or panel). Cautions are accompanied by an amber flag and are annunciated once. Advisories are accompanied by a green flag or no flag, depending on condition, and are accompanied by a single voice annunciation or chime.

CWA Flags are stacked with warnings displayed on top, followed by cautions and then advisories. Certain warnings and cautions are prioritized (i.e., a lower priority warning or caution is not shown while a higher priority warning or caution is active) by the system to minimize cockpit distractions.

## 2.4 DISPLAYS

Each integrated display unit (IDU) incorporates eight peripheral buttons (each labeled for a dedicated function) a brightness knob (left side), a menu control knob (right side), and an optional slip indicator. The peripheral buttons and slip indicator are backlit. The buttons are separated by machined “prongs” that isolate the buttons to prevent inadvertent actuation.



Photo 3 PFD



Photo 4 MFD

There are two kinds of functions: button functions and menu functions. Button functions are activated by pushing a button labeled accordingly. Menu functions are activated by pushing a button adjacent to the desired menu on the screen.

The brightness knob turns clockwise to increase screen brightness and counterclockwise to decrease screen brightness. Pushing the brightness knob while turning adjusts the button and slip indicator brightness in the same manner.

To activate a button function, push the corresponding button.

To activate a menu function, push the button that corresponds with the menu. To display menus, push the Menu button.

When a menu appears in the lower right corner of the screen, it is controlled with the right-hand knob. Turn the knob to scroll to the desired menu item, letter, or number, and then push to select.

If there are no menus shown on the PFD screen, turning the control knob sets the barometric pressure for the altimeter. Pushing it has no function. Likewise, turning the control knob on the MFD when there are no menus shown sets the scale of the map. Pushing the knob on the MFD instantly brings up a reversionary PFD screen; pushing it again returns to the navigation display.

Once inside the menu structure, the top left button (adjacent to the BACK menu) always takes you back one step in the menu structure. The top right button (adjacent to the EXIT menu) always takes you completely out of the menus.

## **2.5 REMOTE SENSORS**

### **2.5.1 ATTITUDE AND HEADING REFERENCE SENSOR**

The AHRS provides an accurate attitude and heading reference in DO-160D avionic dynamic environments including altitude, temperature, shock, and vibration. The AHRS supports the Chelton Flight Systems Flight Logic Synthetic Vision EFIS primary flight display (PFD) with aircraft heading and attitude data, derived from inertial instrument and magnetic instrument data.

The **Crossbow Technologies** Attitude and Heading Reference (AHRS) sensor supports the Attitude and Heading functions within the system. Each AHRS is a self contained LRU whose functions / software are fully compliant with applicable TSO's.

The AHRS500GA is a six Degree-of-Freedom (DOF) strap down inertial measurement and attitude reference system that employs three solid-state angular-rate sensors, three solid-state accelerometers, three fluxgate magnetometers and high speed digital microprocessor based electronics. The AHRS500GA is a self-contained unit in a single, all-metal housing. It is sealed to keep out moisture and operate through altitude and temperature range. The all-metal housing and connector system are designed to provide EMI protection. The AHRS500GA supports RS-232 and RS-422 interfaces. The AHRS500GA is a dedicated piece of equipment and only outputs data for use by other controlling systems.

**LITEF GmbH** is an alternate supplier for an Attitude and Heading Reference (AHRS) sensor to support the Attitude and Heading functions.

The LCR-93 is a six Degree-of-Freedom (DOF) strap down inertial measurement and attitude reference system that employs three fiber optic angular-rate sensors (gyros), three micromechanical accelerometers, high speed digital microprocessor based electronics, and a remotely-mounted fluxgate magnetometers. The LCR-93 is compliant with all applicable TSO's and supports ARINC 429 interfaces. The LCR-93 is a dedicated piece of equipment and only outputs data for use by other controlling systems.

An AHRS with ARINC 429 capabilities can be used in place of the Crossbow AHRS or the Litef AHRS. FAA approval for an ARINC 429 AHRS is not provided under the Chelton Flight Systems STC. Refer to the Chelton Flight Systems EFIS Installation Instructions for additional information.

### **2.5.2 WAAS-GPS**

The **FreeFlight Systems** Wide Area Augmentation System Global Positioning Sensor (WAAS-GPS) supports the Navigation functions within the system. Each GPS is a self contained LRU

The GWSS is a GPS/WAAS Sensor System, which provides position, velocity and integrity data to Flight Logic Synthetic Vision EFIS. The GWSS navigates worldwide by processing Global Positioning System (GPS) and Wide Area Augmentation System (WAAS) signal data to compute aircraft position and velocity and position solution integrity estimates. The system interfaces to the Flight Logic Synthetic Vision EFIS via an RS-232 serial interface. The system consists of two Line Replaceable Units (LRUs): a Sensor/Processor Unit (SPU) and a GPS antenna unit.

The GWSS is an update to Free Flight's previously approved 12-channel GPS sensor card (the GS12). The GWSS performs the GPS navigation and integrity functions for the EFIS II System.

### **2.5.3 AIR DATA COMPUTER**

The ***Shadin Air Data Computer*** supports the Air Data functions within the system. Each ADC is a self contained LRU which is capable of operation up to 55,000 feet, with an operating temperature of -20 +55°C. The unit is compliant with all applicable TSO's and compliant with Environmental qualification to DO-160B. The ADC provides outputs of IAS, TAS, Mach, P.ALT, Baro Corrected ALT, D. ALT, OAT, TAT, Wind Aloft, Fuel Flow, L Fuel Used, R Fuel Used, and Altitude Blind Encoder output

An ADC with ARINC 429 capabilities, including RVSM capable ADC, can be used in place of the Shadin ADC. FAA approval for an ARINC 429 ADC is not provided under the Chelton Flight Systems STC. Refer to the Chelton Flight Systems EFIS Installation Instructions for additional information.

### **2.5.4 ANALOG INTERFACE UNIT**

The optional ***Chelton Flight Systems Analog Interface Unit*** is an analog to digital converter that converts on board navigational equipment outputs and discrete signals to digital form for use by the Flight Logic Synthetic Vision EFIS system. These signals include VOR/LOC, Glide Slope, Flight Director, Auto Pilot, ADF, Marker Beacon and Radar Altimeter.

### **2.5.5 SECURAPLANE XL2410 DEDICATED BATTERY**

The optional ***Securaplane XL2410 Dedicated Battery*** provides emergency backup 24 VDC power to the EFIS System. It consists of two 13 Ah Hawker Genesis lead acid batteries with a charge control and protection circuitry located in the assembly. The batteries are configured in a series combination to yield a 24 VDC, 13 Ah battery. If the aircraft bus drops below 25-26 VDC, the battery automatically supplies the output load.

### **2.5.6 POWER SONIC PS-12180 DEDICATED BATTERY**

The optional ***Power Sonic PS-12180 Dedicated Battery*** provides emergency backup 12 VDC power to the EFIS System. It is a completely sealed lead acid battery with dilute sulphuric acid electrolyte that is suspended and thus immobilized. The battery is leak proof and maintenance free. In the event of an aircraft power failure, the battery automatically supplies 12VDC to the Flight Logic Synthetic Vision EFIS System.

**A complete description of the functions of the EFIS is contained in the Chelton EFIS II Pilot's Guide and Reference, Doc. No. 150-045240.**



### **3 CONTROL AND OPERATION INFORMATION**

Chelton Flight Systems Flight Logic Synthetic Vision EFIS system Control /Operation is contained in the Chelton Flight Logic Synthetic Vision EFIS Pilot's Guide and Reference Doc. No. 150-045240, and installation information is contained in the Flight Logic Synthetic Vision EFIS Installation Guide, Doc. No. 150-045264.

### **4 SERVICING INFORMATION**

#### **4.1 EFIS IDU**

The LCD screen is easily damaged. Avoid rubbing with a hard or sharp object. Wipe water off immediately as long contact may cause discoloration or spots. Clean a soiled screen with an absorbent soft cotton cloth.

#### **4.2 28 VDC DEDICATED BATTERY (OPTIONAL)**

The XL2410 batteries are sealed lead acid and do not require any servicing. Replace the sealed lead acid batteries in the Securaplane XL2410 Battery Unit in the 48<sup>th</sup> month after installation. (Reference: Securaplane CMM 24-32-12)

#### **4.3 12 VDC DEDICATED BATTERY (OPTIONAL)**

Inspect for evidence of physical damage, loose connections, and electrolyte loss during pre-flight and post-flight inspections. Perform a battery test annually by placing the fully charged battery under a 9 amp load for one hour. The voltage after one hour should be no less than 10.5 VDC. Replace the battery prior to the 36th month after installation.

### **5 MAINTENANCE INSTRUCTIONS**

#### **5.1 DATABASE UPDATES**

##### **5.1.1 NAVIGATION AND OBSTRUCTION DATA BASES**

The customer may receive a SmartMedia card with the latest Nav and alternately Nav and Obst data base updates approximately every three weeks via mail. The customer will update the system by installing the SmartMedia card in each IDU and performing the update procedure outlined in the Ground Maintenance Functions section in Chapter 5 of the Chelton Flight Systems Flight Logic Synthetic Vision EFIS Installation Guide, document number 150-045264.

The customer can access the Chelton Flight Systems internet site, [www.cheltonflightsystems.com](http://www.cheltonflightsystems.com), and download an authorized version of the data base(s). The customer will copy the data base(s) to a SmartMedia card and update each IDU by performing the update procedures outlined in the Ground Maintenance Functions.



### 5.1.2 TERRAIN DATA BASE

The terrain database is stored on an internal solid-state flash drive. Updating the terrain database requires replacing this drive, which requires removal of the IDU from the tray. The Terrain Database update is “on condition” and must be updated by an authorized maintenance technician at an FAA Certified Repair Station. Contact Chelton Flight Systems at (208) 389-9959 or on the web at [www.cheltonflightsystems.com](http://www.cheltonflightsystems.com) for the location of the nearest repair station.

### 5.2 SECURAPLANE XL2410 DEDICATED BATTERY

Must have an “On Aircraft Energy Level Test” as specified in paragraph 5.4.6 performed at least once every 6 months. If in storage, recharge every 6 months. Reference to the “Maintenance Practices” section of the Securaplane Battery CMM, 24-32-12, Rev B or later revision for testing, replacement and storage procedures.

### 5.3 STRUCTURAL INSPECTIONS

No inspections required

### 5.4 SYSTEM OPERATIONAL CHECKOUT AFTER MAINTENANCE

**NOTE: It is the Owner’s/Operator’s responsibility to ensure that after maintenance is performed on the system, a system checkout is performed to verify that the maintenance did not adversely affect the operation or intended functionality.**

#### 5.4.1 EFIS II IDU MAINTENANCE

- a) Apply aircraft power
- b) Press the EFIS Master Switch or Avionics Master Switch to ON
- c) Observe that there are no warning flags displayed on the PFD and/or MFD
- d) Adjust the screen brightness by turning the left-hand control knob.
- e) Adjust the button and slip indicator brightness by simultaneously pushing and turning the left-hand control knob.
- f) Open the AHRS circuit breaker.
- g) Confirm the PFD/MFD display loss of attitude and loss of heading display information.
- h) Listen for the “ATTITUDE FAILURE, ATTITUDE FAILURE” voice warning over the intercom.
- i) Close the AHRS circuit breaker.
- j) Open the ADC circuit breaker.
- k) Confirm the PFD display loss of altitude and loss of airspeed display information.
- l) Listen for the “AIR DATA FAILURE, AIR DATA FAILURE” voice warning over the intercom.
- m) Close the ADC circuit breaker.
- n) Press the EFIS Master Switch or Avionics Master Switch to OFF
- o) Remove power from the aircraft.

#### 5.4.2 GPS SENSOR MAINTENANCE

**NOTE: The GPS antenna must be in view of satellites during the following procedure.**

- a) Apply aircraft power

- b) Press the EFIS Master Switch or Avionics Master Switch to ON
- c) Open the appropriate GPS circuit breaker.
- d) Listen for a "GPS failure, GPS failure" voice warning heard on the aircraft intercom.
- e) Observe the "No GPS" amber warning flag on the MFD.
- f) Using the EFIS Faults menu, verify the GPS Sensor is notated with "X", signifying a fault.
- g) Close the appropriate GPS circuit breaker.
- h) Observe that the "No GPS" warning flag disappears from the MFD.
- i) Using the EFIS Faults menu, verify the GPS Sensor is normal.
- j) Press the EFIS Master Switch or Avionics Master Switch to OFF
- k) Remove power from the aircraft.

#### **5.4.3 ANALOG INTERFACE UNIT (AIU) (OPTIONAL) MAINTENANCE**

- a) Apply aircraft power
- b) Press the EFIS Master Switch or Avionics Master Switch to ON
- c) Open the AIU circuit breaker.
- d) Listen for an "Auxiliary Sensor Failure, Auxiliary Sensor Failure" voice warning heard on the aircraft intercom.
- e) Observe the "Aux Sensor" amber warning flag on the MFD.
- f) Using the EFIS Faults menu, verify the AIU is notated with "X", signifying a fault.
- g) Close the appropriate AIU circuit breaker.
- h) Observe that the "Aux Sensor" warning flag disappears from the MFD.
- i) Using the EFIS Faults menu, verify the AIU is normal.
- j) Perform a VOR/LOC system check using the aircraft Maintenance Manual.
- k) Perform a Radar Altimeter system check using the aircraft Maintenance Manual.
- l) Press the EFIS Master Switch or Avionics Master Switch to OFF
- m) Remove power from the aircraft.

#### **5.4.4 FUEL/AIRDATA COMPUTER (ADC) MAINTENANCE**

- a) Perform the Leak, Altitude and Airspeed test specified in the Shadin Fuel/Airdata Computer Installation Manual. Doc# IM2830, or the ARINC 429 ADC Maintenance Manual, as appropriate.

#### **5.4.5 AHRS MAINTENANCE**

- a) Place the aircraft on a Compass Rose.
- b) Perform a Compass Alignment in accordance with the Crossbow AHRS500GA-( ) Installation Manual, Doc.# 7410-0001-03 or the LITEF LCR-93 AHRS Installation / Maintenance Manual, Doc.# 142185-0000-840, or the ARINC 429 AHRS Maintenance Manual, as appropriate.

#### **5.4.6 28 VDC DEDICATED BATTERY (OPTIONAL) MAINTENANCE**

- a) Apply aircraft power
- b) Verify CB1 on the front of the battery unit is set.
- c) Press the "LEVEL TEST" button on the front of the battery unit.
- d) After 5 seconds one of the three LED's will come on, indicating the energy remaining in the battery
  - Above 65% is indicated as FULL (green LED)
  - Between 50% and 65% is indicated MID (yellow LED)

- At or below 50% is indicated as LOW (red LED)
- For Yellow or Red LED indication, charge battery for 2 hours and repeat test. If same results, send to repair shop.

#### 5.4.7 12 VDC DEDICATED BATTERY (OPTIONAL) MAINTENANCE

- Do Not Apply aircraft power
- Place aircraft battery switch in OFF position
- Place EFIS BATTERY switch to ON
- Place EFIS 1 MASTER switch to ON
- Observe BATT ON (White) annunciator illuminates on instrument panel.
- Place EFIS BATTERY switch to OFF
- Observe BATT ON (White) annunciator extinguishes on instrument panel.

### 6 TROUBLESHOOTING INFORMATION

See troubleshooting guide in Chapter 8 in the Chelton Flight Systems Flight Logic Synthetic Vision EFIS Installation Guide, 150-045264, Crossbow AHRS500GA-( ) Installation Manual, Doc.# 7410-0001-01, LITEF LCR-93 AHRS Installation / Maintenance Manual, Doc.# 142185-0000-840, Free Flight GPS Equipment Installation Manual, Doc.# 84143-01, Shadin Fuel/Airdata Computer Installation Manual. Doc# IM2830, or Securaplane XL2410-01 Emergency Battery CMM, Doc.# 24-32-12.

For wiring diagram information refer to Chapter 4 in the Chelton Flight Systems Flight Logic Synthetic Vision EFIS Installation Guide, 150-045264.

**NOTE: It is the responsibility of the Maintenance Technician to verify with the Vendor that the Equipment Manual being used is the latest revision.**

#### 6.1 REMOVE AND REPLACEMENT INFORMATION

MANUFACTURER	P/N	DESCRIPTION
Wulfsberg Electronics	401-045500-0101	Integrated Display Unit
Shadin	681201A-1	Temp Probe
Shadin	962830A-1-S-8	Air Data Computer
	962830A-2-S-8	
	962830A-3-S-8	
Freeflight	84100-02-03XX	GPS/WAAS Sensor
Freeflight	81194	GPS Antenna
Crossbow	8350-0062-XX	AHRS
LITEF GmbH	142185-xxxx	AHRS
Artex Aircraft Supplies	453-7000	Analog Interface Unit
Securaplane	100-2410-01	28 VDC Dedicated Battery (Optional)
Power Sonic	PS-12180	12 VDC Dedicated Battery (Optional)

### **6.1.1 FLIGHT LOGIC SYNTHETIC VISION EFIS IDU**

To remove the IDU loosen the locking mechanism and pull the unit from the instrument panel. Install in reverse order. See paragraph 5.4.1 for checkout procedures.

### **6.1.2 GPS SENSOR**

To remove the GPS Sensor remove the electrical connector and the 4 mounting screws. Install in reverse order. See paragraph 5.4.2 for checkout procedures.

### **6.1.3 GPS ANTENNA**

To remove the GPS Antenna remove the electrical connector and the 4 mounting screws. Install in reverse order. Apply a Fillet Seal around the base of the antenna using MIL-S-8802 sealant. See paragraph 5.4.2 for checkout procedures.

### **6.1.4 ANALOG INTERFACE UNIT (AIU) (OPTIONAL)**

To remove the AIU remove the electrical connector and the 4 mounting screws. Install in reverse order. See paragraph 5.4.3 for checkout procedures.

### **6.1.5 FUEL/AIRDATA COMPUTER (ADC)**

To remove the ADC remove the electrical connector. Disconnect the Pitot and Static Lines, capping the exposed fittings. Loosen the thumb screw to remove unit. Install in reverse order. Configure the ADC and set the K-factors as specified in the Shadin Fuel/Airdata Computer Installation Manual, Doc. # IM2830, Sections 9.0 and 10.0, respectively. See paragraph 5.4.4 for checkout procedures.

### **6.1.6 AHRS500GA**

To remove the Crossbow AHRS500GA remove the electrical connector. Record or mark the placement of any washers or shims before removing the 4 mounting screws. Install the AHRS being careful to re-install the washers or shims in the same locations. Install the four mounting screws. Connect the electrical connector. See paragraph 5.4.5 for checkout procedures.

### **6.1.7 LCR-93 AHRS (ALTERNATE PART)**

To remove the LITEF LCR-93 AHR, remove the electrical connectors. Loosen the lock-down on the front of the mounting tray and slide the unit out of the tray. Install the new unit by sliding the unit into the mounting tray and tighten the lock-down on the front of the unit. Connect the electrical connectors. See paragraph 5.4.5 for checkout procedures.

### **6.1.8 28 VDC DEDICATED BATTERY (OPTIONAL)**

To remove the 28 VDC Dedicated Battery pull CB1 on the front of the unit. Loosen the hold-down knobs on the front of the battery tray. Using the handle on the front of the battery, pull the battery straight out of the tray. Install in reverse order. See paragraph 5.4.6 for checkout procedures.

### **6.1.9 12 VDC DEDICATED BATTERY (OPTIONAL)**

To remove the 12 VDC Dedicated Battery, disconnect the power leads. Remove the 2 screws and washers securing the hold down strap. Lift the battery out of the positioning brackets. Install in reverse order. See paragraph 5.4.7 for checkout procedures.

**NOTE: Prior to replacing the 12 VDC Dedicated Battery it must be fully charged in the following manner:**

Cycle Application: Limit initial current to 3.6A. Charge until battery voltage (under charge) reaches 14.40 to 14.70 volts at 68 degrees F (20 degrees C). Hold at 14.40 to 14.70 volts until current drops to approximately 180mA. Battery is fully charged under these conditions, and charger should either be disconnected or switched to “float” voltage.

“Float” or “Stand-by” Service: Hold battery across a constant voltage source of 13.50 to 13.80 volts continuously. When held at this voltage, the battery will seek its’ own current level and maintain itself in a fully charged condition.

**Note: For previously installed emergency power systems refer to applicable ICAW.**

## **7 WIRING DIAGRAMS**

The Chelton Avionics wiring diagrams associated with this alteration are 702-045250 and 702-045251. These drawings are to be given to the customer for incorporation in the aircraft Wiring Diagrams Manual.

## **8 SPECIAL INSPECTION REQUIREMENTS**

On an annual or 100 hour basis, the internal cooling fan in the IDU should be inspected for dust buildup and proper operation.

### **8.1 IDU-III INTERNAL COOLING FAN SERVICE PROCEDURE**

1. Remove power from the IDU
2. Remove the IDU from the tray following the procedure outlined in section 6.1.1 of this document.
3. From the back of the IDU, remove the six Philips head screws securing the fan cover plate.
4. Using a source of clean, low pressure compressed air, carefully blow any dust out of the fan and the surrounding area. Use short bursts of air, less than one second in duration, to avoid over revving the fan.
5. Manually spin the fan and feel for any rough rotation or play in the rotor bearings. There should be no perceptible play in the bearings. If there is noticeable play in the rotor bearings, or if the rotation feels gritty or non smooth, the fan will need to be replaced by a technician at a certified repair station. Contact Chelton Flight Systems at (208) 389-9959 or at [www.cheltonflightsystems.com](http://www.cheltonflightsystems.com) and ask to speak to a technical service person.
6. Use a soft damp cloth or swab to remove any remaining dust in the fan cavity or on the fan.
7. Once the fan is clean and determined to be in good working order, the unit can be returned to service.
8. Attach the fan cover plate using the six Philips head screws.

9. Reinstall the IDU into the tray following the procedure outlined in section 6.1.1 of this document.
10. Perform the system operational checkout procedure outlined in section 5.4.1 of this document.

## **9 APPLICATION OF PROTECTIVE TREATMENTS**

N/A

## **10 DATA FOR STRUCTURAL FASTENERS**

Fastener data specified on the following STC drawings:

150-045011 IDU Installation

150-045050 GPS Antenna Installation

150-045051 Remote Sensors Installation

## **11 LIST OF SPECIAL TOOLS**

A crimp tool and positioner/locator meeting MIL Specification M22520/1-01 or equivalent are required to ensure consistent, reliable crimp contact connections for the rear d-sub connectors.

These tools are available from ITT Cannon or other vendors:

ITT Cannon  
1851 E. Deere Ave.  
Santa Ana, CA 92705-6500

Phone (714) 261-5300  
Fax (714) 575-8324

Insertion Tool:	ITT part#274-7048-000 (Desc. CIET-22D-01)
Crimp Tool (HD):	ITT part#995-0001-584 (Desc. M22520/2-01)
Locator Tool:	ITT part#995-0001-244 (Desc. M22520/2-07)
Locator Tool (HD):	ITT part#995-0001-739 (Desc. M22520/2-06)
Locator Tool (HD):	Desc. M22520/2-09

## **12 COMMUTER CATEGORY AIRCRAFT**

Electrical load must be maintained within 80% of generator capacity for systems installed (AC 43.13-1B)

## **13 RECOMMENDED OVERHAUL PERIODS**

No additional overhaul time limitations.

## **14 AIRWORTHINESS LIMITATIONS**

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

Structural Inspections: No structural inspections required.

28 VDC Dedicated Battery (Optional): Replace the sealed lead acid batteries in the Securaplane XL2410 Battery Unit prior to the 48<sup>th</sup> month after installation.

(Reference: Securaplane CMM 24-32-12)

12 VDC Dedicated battery (Optional): Replace the battery prior to the 36th month after installation.

If an installed autopilot is replaced with an autopilot listed in the AIU Install Manual (doc #570-7000), the AIU must be reconfigured accordingly. If the autopilot is replaced with an autopilot not listed, additional approval is required.